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THE MYSORE GAZETTE.

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Separate paging is given to this Part in order that it may be filed as a separate compilation.

PART IV.

Official Papers.

REPORT ON INDIAN WHEAT BY McDOUGALL BROTHERS.

From T. W. Holderness, Esq., c. s., Offg. Secretary to the Government of India, To the Governments of Bengal, Punjab, N. W. Provinces and Oudh, The Chief Commissioner of the Central Provinces,—The Secretary for Berar to the Resident at Hyderabad,—Revenue and Agricultural Department—Agriculture—Circular No. 57A., dated Simla, the 10th August 1883.

I AM directed to forward the papers noted in the margin, regarding the cultivation of wheat, and to suggest that instructions similar to those recently issued by the Government of Bombay to its District officers might, with the permission of His Honor the Lt. Governor, be issued by the Government of—
you.

From Bengal Chamber of Commerce, dated 24th July 1883.
Resolution of the Bombay Government, No. 4734, dated 23rd June 1883.

2. The suggestion made by the Bengal Chamber of Commerce that prizes might be given for good cultivation seems also to merit consideration. The subject is one which might profitably engage the attention of district agricultural societies where they exist, and might be commended to their notice.

Copy, with copy of the enclosures, forwarded to the Foreign Department, with a request that the papers be communicated for information to the Political officers in any Native States in which wheat is grown for export.

T. W. HOLDERNESSE,
Offg. Secretary to the Govt. of India.

From H. W. I. Wood, Esq., Secretary, Bengal Chamber of Commerce, To the Secretary to the Government of India, Revenue and Agricultural Department, dated Calcutta, 24th July 1883.

I AM directed by the Committee of the Chamber of Commerce to submit, for the consideration of His Excellency the Viceroy and Governor General, the enclosed Resolution of the Government of Bombay on a representation by the Bombay Chamber relative to the expediency of steps being taken to urge upon growers of wheat the importance in their own interests of preventing admixture with the wheat of other grain or foreign substances and impurities which tends to lower prices being obtained than might otherwise be secured.

In placing this matter before His Excellency, the Committee direct me to express their hope that similar orders may be issued by the Government of India to Commissioners or other authorities of districts where wheat is cultivated for exportation.

It has also been suggested that the cultivation of wheat would be improved, and the admixture of inferior grains prevented, if Government were to offer, through local officers in the wheat-growing districts, small prizes for the best farmed fields in which no other grains were grown, and the Committee of the Chamber venture to recommend the suggestion to His Excellency's notice.

READ THE FOLLOWING :—

Extract from the Proceedings of the Government of Bombay, Revenue Department,—No. 4734, dated Bombay Castle, 23rd June 1883.

From the Secretary, Bombay Chamber of Commerce, To the Secretary to the Government of Bombay, Revenue Department, dated Bombay, 7th June 1883.

IN the memorandum regarding the cultivation of wheat, &c., in the Bombay Presidency, including Sind, forwarded to the Chamber with your letter No. 7181, dated 14th October 1882, and in other papers issued by Government on the same subject, reference is made to the well-known fact that the relatively low price of Indian wheat in the London market is not so much due to its quality, which is generally very good, but to its admixture with dirt and other inferior grains, and that this admixture of inferior grains with the wheat is due to the fact that cultivators often grow other grains in the same field as wheat as a resource in the event of the failure of the wheat crop.

As the trade in Indian wheat is rising to great importance, and as it is most desirable that this practice should be discontinued, and the position of Indian wheat improved in the markets of Europe, the Committee of the Chamber of Commerce desire me to request that His Excellency the Governor in Council may be pleased, in the interest of the country, to order the local officers of Government in all districts where wheat is grown to take whatever steps may be possible to prevent this admixture being resorted to.

RESOLUTION.—Copies of the letter from the Chamber of Commerce should be forwarded to the Commissioner in Sind and the Commissioners of Divisions, who should be requested to communicate the remarks of the Chamber of Commerce to the Collectors of wheat-producing districts in their respective Divisions, and desire the Collectors to urge on wheat growers the importance in their own interests of preventing admixture with the wheat of dirt, other grain, or other foreign substance which leads to their obtaining for the wheat produced by them a lower price than they might otherwise secure.

2. Copies should also be forwarded to the Survey and Settlement Commissioner, and the Political officers in charge, Native States, where wheat is grown. A copy should be sent to Mr. E. C. Ozanne on his return to duty.

Government of India, Revenue and Agricultural Department, (Agriculture), To the Secretary to the Government of India, Foreign Department, Office Memorandum, No. 780A., Simla, the 25th August 1883.

The undersigned is directed to forward for communication, if thought necessary, to Native States 5 copies of a Report on Indian Wheat, received from Her Majesty's Secretary of State, together with a copy of the covering despatch.

T. HOLDERNESS,
Offg. Under-Secy. to the Govt. of India.

REPORT ON INDIAN WHEAT BY McDougall Brothers.

To the Secretary of State for India.

MY LORD,

We have the honor to report upon the Indian wheats comprised in the four lots delivered to us by your brokers, Messrs. Harris Brothers & Co., which we have operated upon according to instructions contained in your Lordship's communications to us of 8th October and 25th October 1880, and supplemented by the verbal instructions made to us (we beg to refer to these communications and to our replies of 22nd October, 26th October, and 24th November 1880). These instructions were to the effect—

I. That we should take a given quantity of each of these four representative Indian wheats, *viz.*—

Indian, fine soft white,	Indian average hard white,
„ superior soft red,	„ „ „ red,

and manufacture them into flour by the ordinary process of grinding under millstones. Also that we should take similar quantities of the same wheats and manufacture them into flour by means of crushing between rollers, according to the system known as the Hungarian or roller system.

II. That we should take a given quantity of each flour so produced and manufacture it into bread.

III. That we should note the qualities and other characteristics of the flours produced, also of the offals, *viz.*, middlings, pollard, and bran.

IV. That we should procure the following representative wheats, of fair average quality of the season, as then being sold on Mark Lane market, and, for the purpose of obtaining results for comparison, deal with them precisely as above indicated, both as regards flour, bread, and offals, *iz.* :—

English average.	Californian average.	Russian, Ghirka.
American (red winter).	Russian, Saxonska.	Egyptian, Buhi.
„ (spring).	„ Taganrog.	„ Saida.
Australian average.	„ Kubanka.	

Note.—Of the two latter qualities of Russian wheats, Kubanka and Ghirka, none was to be obtained in London or other English markets, and consequently cannot be included in this report.

These operations have all been carried out in our own mills and bakeries with due care and precision, and under the personal supervision of one of the members of our firm, during the whole period occupied until their completion.

We beg to report as follows :—

The quantity of each wheat operated upon by each system of milling was 5,000 lbs., as delivered from the ship (weight of sacks or bags not included).

The results obtained are stated in the following tables, which are followed by tabulated synopsis for convenience of ready comparison.

WHEAT.

Lot 1.—Indian, fine soft white.

Quality—Fine soft white. (White, medium sized, skin thin, clean, and regular, free from seeds ;
2 per cent weevilled ; handled exceedingly well.)

Value in London, 49s. per 496 lbs.

Weight per bushel, 64 lbs. (This weight is only equalled by specially fine samples of any wheat.)

Weight of 100 separate grains of the wheat, 55·4 grains avoirdupois. (100 weevilled grains weighed only 39·69 grains avoirdupois.)

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as	..	100·00 per cent.	
Impurities removed	..	1·52	"

98·48

Water absorbed to render mellow :	2·00	"
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100·48

Yield : flour	77·46	"
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" middlings	·82	"
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" pollard	8·80	"
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" bran	12·00	"
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99·08

Evaporation and loss	..	1·40	"
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100·48

Gluten, by water test, when damp.	16·4	"
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Do do when dry ..	6·4	"
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2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as	..	100·00 per cent.	
Impurities removed	1·52	"

98·48

Water absorbed to render mellow :	2·00	"
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100·48

Yield : flour	72·2	"
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" dark do	1·9	"
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74·1

" middlings	11·0	"
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" pollard	8·7	"
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" bran	4·0	"
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97·8

Evaporation and loss	..	2·68	"
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100·48

Gluten, by water test, when damp.	20·2	
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Do do when dry ..	6·8	
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(A high yield, fine white color, and superior bloom.)

(See Notes, page 28.)

(An exceedingly high yield, fine white color, and superior in bloom.)

(See Notes, page 28.)

Lot 2.—Indian; superior soft red.

Quality—Superior soft red. (Color dull light brown, with about 5 per cent. white wheat; size half medium and half small; skin thin; weevil only a trace; clean and free from seed; handled well.)

Value in London, 45s. per 496 lbs.

Weight per bushel, 62½ lbs. (Good.)

Weight of 100 separate grains of the wheat, 51.8 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed .. 72. "

99.28

Water absorbed to render mellow. 3.60 "

102.88

Yield: flour .. 78.40 "

" middlings .. 1.68 "

" pollard .. 9.80 "

" bran .. 9.40 "

(A high yield, color medium.)

99.28

Evaporation and loss .. 3.60 "

(See Notes, page 28.)

102.88

Gluten, by water test, when damp. 24.6 "

Do do when dry.. 9.3 "

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed .. 72. "

99.28

Water absorbed to render mellow. 3.60 "

102.88

Yield: flour .. 74.2 "

" dark do .. 1.2 "

(A high yield, color good and with bloom.)

75.4

" middlings .. 7.7 "

" pollard .. 13.5 "

" bran .. 5.3 "

101.9

Evaporation and loss .. 98 "

(See Notes, page 28.)

102.88

Gluten, by water test, when damp. 23.4 "

Do do when dry.. 10.5 "

Lot 3.—Indian, average hard white.

Quality—Average hard white. (Color light yellow, and semi-transparent, with a little hard red; size long and arched; skin thin; wheat clean, but about 3 per cent. of dry hard mud in large pieces; weevil only a trace.)

Value in London, 44s. per 496 lbs.

Weight per bushel, 60 lbs.

Weight of 100 separate grains of the wheat, 68·3 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 3·7 .. (Contained an excess of dry earth or mud.)

Water absorbed to render mellow. 96·3 ..
8·4 .. (Very high.)

104·7 ..

Yield : flour .. 80·52 ..

„ middlings .. 78 ..

„ pollard .. 10·0 ..

„ bran .. 8·3 ..

Evaporation and loss .. 99·60 ..

5·1 .. (See Notes, page 28.)

104·7 ..

Gluten, by water test, when damp. 31·4 ..

Do do when dry.. 11·7 ..

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 3·7 ..

Water absorbed to render mellow. 96·3 ..
8·4 .. (Very high.)

104·7 ..

Yield : flour .. 72·1 ..

„ dark do .. 1·1 ..

„ middlings .. 73·2 ..

„ pollard .. 10·3 ..

„ bran .. 14·3 ..

„ bran .. 3·1 ..

Evaporation and loss .. 100·9 ..

3·8 .. (See Notes, page 28.)

104·7 ..

Gluten, by water test, when damp. 33·2 ..

Do do when dry.. 12·6 ..

Lot 4.—Indian, average hard red.

Quality—Average hard red. (Color very dull brown, semi-transparent, with 10 per cent fine, soft, white, large, coarse grains, arched and pointed.)

Value in London, 43s. per 496 lbs.

Weight per bushel, $61\frac{1}{4}$ lbs. (Condition clean and free from dirt, but a little grain, seed, and linseed and barley; free from weevil.)

Weight of 100 separate grains of the wheat, 77.7 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed.. .. 1.2 ..

98.8 ..

Water absorbed to render mellow. 7.6 ..

106.4 ..

Yield : flour 79.88 ..

„ middlings 78 ..

„ pollard 13.20 ..

„ bran 8.50 ..

102.36 ..

Evaporation and loss .. 4.04 ..

106.4 ..

Gluten, by water test, when damp 40.4 ..

Do do when dry 13.4 ..

(An exceedingly high yield; color inferior.)

(See Notes, page 28.)

2. *System.*—Crushing between rollers.

Quantity operated upon 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed.. .. 1.2 ..

98.8 ..

Water absorbed to render mellow 7.6 ..

106.4 ..

Yield : flour 72.3 ..

„ dark do 1.9 ..

74.2 ..

„ middlings 10.3 ..

„ pollard 13.8 ..

„ bran 3.0 ..

101.3 ..

Evaporation and loss .. 5.1 ..

106.4 ..

Gluten, by water test, when damp. 41.6 ..

Do do when dry 13.1 ..

(Very high.)

(A high yield; color inferior.)

(See Notes, page 28.)

Lot 5.—English.

Quality—English. (Color, average red; skin thick and heavy; clean, tough from unfavorable season.)

Value in London, 49s. per 496 lbs.

Wheat per bushel, 60½ lbs. (This wheat in dry season would weigh 63 lbs.)

Weight of 100 separate grains of the wheat, 574 grains avoirdupois.

1. System.—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 1·5 ..

98·5 ..

Water absorbed to render mellow; none required.

Yield: flour .. 65·2 ..

„ middlings .. 1·1 ..

„ pollard .. 9·7 ..

„ bran .. 17·7 ..

93·7 ..

Evaporation and loss .. 4·8 ..

98·5 ..

Gluten, by water test, when damp 32·8 ..

Do do when dry 10·6 ..

(Already contained some excess of moisture. Would have worked better if mixed with a dry wheat.)

(This low percentage owing to dampness of the wheat, and consequent thickness of skin. Color good, but not up to average in bloom.)

(Exceedingly high from toughness of wheat; did not cleanwell.)

(Evaporation was high from damp condition of wheat. See Notes, page 28.)

2. System.—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 1·5 ..

98·5 ..

Water absorbed to render mellow: none.

Yield: flour .. 67·8 ..

„ dark .. 2·5 ..

70·3 ..

„ middlings .. 7·6 ..

„ pollard .. 7·2 ..

„ bran .. 9·2 ..

94·3 ..

Evaporation and loss .. 4·2 ..

98·5 ..

Gluten, by water test, when damp 34·2 ..

Do do when dry.. 11·4 ..

(The same remarks apply here as above.)

(See Notes, page 28.)

Lot 6.—Australian.

Quality—Australian. (Skin medium thickness ; short plump grain, with an admixture of about 1 per cent black oats, straw, and chaff.)

Value in London, 50s 6d. per 496 lbs.

Weight per bushel, 62½ lbs.

Weight of 100 separate grains of the wheat, 80.5 grains avoirdupois. (Highest weight of any of the grains of wheat.)

1. *System.*—Grinding under millstones.

Quantity operated upon 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed .. 1.0 "

99.0 "

Water absorbed to render mellow,
none.

Yield : flour .. 75.8 "

" middlings .. 1.1 "

" pollard .. 7.4 "

" bran .. 14.4 "

98.7 "

Evaporation and loss..

3 "

99.0 "

Gluten, by water test, when damp

40.8 "

Do do when dry .. 11.6 "

(A good yield, superior white color and bloom.)

(See Notes, page 28.)

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 "

Impurities removed .. 1.0 "

99.0 "

Water absorbed to render mellow,
none.

Yield : flour .. 73.8

" dark .. 1.3

75.1 per cent.

" middlings .. 8.0 "

" pollard .. 9.0 "

" bran .. 5.5 "

97.9 "

Evaporation and loss..

1.1 "

99.0 "

Gluten, by water test, when damp

37.4 "

Do do when dry 12.2 "

(A high yield, color and bloom superior.)

(See Notes, page 28.)

Lot 7.—New Zealand.

Quality—New Zealand. (Short, plump, and regular white grains, in very good and clean condition; skin medium thickness.)

Value in London, 48s. per 496 lbs.

White per bushel, 62 $\frac{3}{4}$ lbs.

Weight of 100 separate grains of the wheat, 67·6 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed. : .. '3 "

99·7 "

Water absorbed to render mellow ;
none required.

Yield : flour .. 76·1 " (A high yield, superior white color.)

" middlings .. '96 "

" pollard .. 8·8 "

" bran .. 11·5 "

97·36 "

Evaporation and loss. 2·34 " (See Notes, page 28.)

99·7 "

Gluten, by water test, when damp 31·0 "

Do do when dry 10·2 "

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. '3 "

99·7 "

Water absorbed to render mellow ;
none required.

Yield : flour .. 73·9

" dark .. 2·2

76·1 "

(A high yield, superior white color and bloom.)

" middlings .. 7·8 "

" pollard .. 6·6 "

" bran .. 5·6 "

96·1 "

Evaporation and loss. .. 3·6 " (See Notes, page 28.)

99·7 "

Gluten, by water test, when damp 26·6 "

Do do when dry 9·0 "

Lot 8.—*Californian*.

Quality—*Californian*. (White and irregular grains; skin rather tough; some barley and oats; condition good.)

Value in Liverpool, 48s. per 496 lbs.

Weight per bushel, 59½ lbs.

Weight of 100 separate grains of the wheat, 47·7 grains avoirdupois.

1. *System*.—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 1·7 "

98·3 "

Water absorbed to render mellow,
none.

Yield : flour .. 71·1 " (Medium yield, color and bloom
" middlings .. 72 " exceptionally good.)
" pollard .. 9·2 "
" bran .. 15·3 "

(A high yield.)

96·32

Evaporation and loss .. 1·98 "

(See Notes, page 28.)

98·3 "

Gluten, by water test, when damp 32·2 "

Ditto, ditto, when dry .. 10·5 "

2. *System*.—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 1·7 "

98·3 "

Water absorbed to render mellow,
none.

Yield : flour .. 68·8 " (Medium yield, color and bloom
" dark .. 1·3 " exceptionally good.)
" middlings .. 14·5 "
" pollard .. 6·3 "
" bran .. 3·9 "

(A high yield.)

94·8

Evaporation and loss .. 3·5 "

(See Notes, page 28.)

98·3 "

Gluten, by water test, when damp 29·6 "

Ditto, ditto, when dry .. 8·7 "

Lot 9.—American winter.

Quality—American winter. (Color red ; grains clean ; skin rather thick, but irregular in size ; condition good.)

Value in London, 49s. 6d. per 496 lbs.

Weight per bushel, 61 $\frac{3}{4}$ lbs.

Weight of 100 grains of the wheat, 49·6 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 5 ..

 99·5 ..

Water absorbed to render
 mellow ; none required.

Yield : flour	..	73·8	per cent.	(A medium yield, color fine.)
" middlings	..	38	"	
" pollard	..	7·9	"	
" bran	..	16·4	"	(A high yield.)
		98·48	"	

Evaporation and loss	..	1·02	"	(See Notes, page 28.)
		99·5	"	

Gluten, by water test, when damp	..	37·0	"
Do do when dry	..	11·0	"

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 5 ..

 99·5 ..

Water absorbed to render
 mellow, none.

Yield : flour	..	70·8	"	(A medium yield, colour and bloom
" dark	..	7	"	very fine.)
		71·5	"	
" middlings	..	10·3	"	
" pollard	..	11·2	"	
" bran	..	3·1	"	
		96·1	"	

Evaporation and loss	..	3·4	"	(See Notes, page 28.)
		99·5	"	

Gluten, by water test, when damp.	..	39·4	"
Do do when dry	..	11·7	"

Lot 10.—*American spring.*

Quality American spring. (Small red grains; skin rather thick; some oats with about 2 per cent cockle and buckwheat.)

Value in London, 48s. per 496 lbs.

Weight per bushel, 61 lbs.

Weight of 100 separate grains of the wheat, 35.5 grains avoirdupois.

1. *System*.—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as 100.0 per cent.

Impurities removed ..	..	9	..
		99.1	..

Water absorbed to render mellow;
none required.

Yield: flour	72.2	per cent.	(Medium yield, color and bloom exceptionally good.)
.. middlings	2.4	..	
.. pollard	7.2	..	
.. bran	14.7	..	

	94.34	..	
Evaporation and loss ..	4.76	..	(See Notes, page 28.)

	99.1	..
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Gluten, by water test, when damp	40.6	..	
Do do when dry ..	15.3	..	(Strength above average.)

2. *System*.—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as 100.0 per cent.

Impurities removed ..	..	9	..
		99.1	..

Water absorbed to render mellow;
none required.

Yield: flour	68.7	..	(Medium yield, color and bloom exceptionally good.)
.. dark	8	..	
	69.5	..	
.. middlings	12.1	..	
.. pollard	10.4	..	
.. bran	3.8	..	

	95.8	..	
Evaporation and loss ..	3.3	..	(See Notes, page 28.)

	99.1	..
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Gluten, by water test, when damp	39.2	..	
Do do when dry ..	14.6	..	(Strength above average.)

Lot 11.—*Russian, Saxonska.*

Quality—Saxonska. (Long, red, transparent grain ; skin medium thickness ; some cockle and oats ; few of the smallest grains unsound, otherwise good condition to work.)

Weight per bushel, 60½ lbs.

Value in London, 52s. per 496 lbs.

Weight of 100 separate grains of the wheat, 37·3 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as	..	100·0 per cent.	
Impurities removed	..	·9	"

99·1 "

Water absorbed to render mellow ; none required.

Yield : flour	..	73·0 per cent.	(Medium yield, color good, strength unequalled.)
" middlings	..	1·2	"
" pollard	..	11·6	"
" bran	..	12·6	"

98·4 "

Evaporation and loss	..	·7	"	(See Notes, page 28.)
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99·1 "

Gluten, by water test, when damp

64·2 "

Do do when dry

22·1 "

(Exceptionally high.)

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as	..	100·0 per cent.
Impurities removed	..	·9

99·1 "

Water absorbed to render mellow ; none required.

Yield : flour	..	70·5 per cent.	(High yield, color good, strength quite unequalled.)
" dark do	..	·9	"

71·4 "

" middlings	..	12·5	"
" pollard	..	11·7	"
" bran	..	3·3	"

98·9 "

Evaporation and loss..	..	·2	"	(See Notes, page 28.)
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99·1 "

Gluten, by water test, when damp

71·0 "

Do do when dry

23·2 "

(Exceptionally high.)

Lot 12.—Russian, Taganrog.

Quality—Hard Taganrog. (Color yellow; size large long transparent grains; about 3 per cent barley and small pieces dry mud; too hard for grinding, required damping; skin thin.)

Value in London, 49s. per 496 lbs.

Weight per bushel, 61½ lbs.

Weight of 100 separate grains of the wheat, 54·7 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 8 ..

99·2

Water absorbed to render mellow 2·4 ..

101·6

Yield: flour .. 76·2

„ middlings .. 1·2

„ pollard .. 12·7

„ bran .. 8·1

98·2

Evaporation and loss .. 3·4

101·6

Gluten, by water test, when damp 51·1

Do do when dry 17·6

(Good yield; much yellow bloom;
very strong.)

(Medium yield.)

(See Notes, page 28.)

(Very high.)

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 8 ..

99·2

Water absorbed to render mellow 2·4 ..

101·6

Yield: flour .. 70·7

„ dark do .. 1·3

72·0

„ middlings .. 9·6

„ pollard .. 12·1

„ bran .. 5·0

98·7

Evaporation and loss .. 2·9

101·6

Gluten, by water test, when damp 47·0

Do do when dry 15·6

(Yield not as high as expected; color
with much yellow bloom.)

(Higher than expected.)

(See Notes, page 28.)

(Very high.)

Lot 13.—*Egyptian, Buhi.*

Quality.—Buhi. (Large white and red grains ; thick skin ; contained 10 per cent barley, and dry mud freely ; required washing ; only one degree better than the Saida wheat. See No. 14.)

Value in Liverpool, 47s. per 496 lbs.

Weight per bushel, 58 lbs.

Weight of 100 separate grains of the wheat, 50.1 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed .. 2.7 "

97.3 "

Water absorbed to render mellow ..

3.1 "

100.4 "

Yield : flour ..

72.9 "

(Medium yield, color poor and murky, no strength, very inferior.)

" middlings ..

1.0 "

" pollard ..

11.0 "

" bran ..

10.0 "

(Yield low.)

94.9 "

Evaporation and loss ..

5.5 "

(See Notes, page 28.)

100.4 "

Gluten, by water test, when damp ..

11.5 "

Do do when dry ..

4.4 "

2. *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100.0 per cent.

Impurities removed .. 2.7 "

97.3 "

Water absorbed to render mellow ..

3.1 "

100.4 "

Yield : flour ..

70.8 "

(Medium yield, color poor, no strength, very inferior.)

" dark do ..

1.8 "

72.6 "

" middlings ..

10.4 "

" pollard ..

8.5 "

" bran ..

3.5 "

(Yield small.)

95.0 "

Evaporation and loss ..

5.4 "

(See Notes, page 28.)

100.4 "

Gluten, by water test, when damp ..

20.2 "

Do do when dry ..

7.9 "

Lot 14.—Egyptian, Saida.

Quality—Saida. (Deservedly ranks as the poorest wheat in the market; medium, hard white grain, with a few darker; skin thick; some rape seed, and large quantity of small pieces of mud; required much washing before use.)

Value in Liverpool, 43s. 6d. per 496 lbs.

Weight per bushel, 57½ lbs.

Weight of 100 separate grains of the wheat, 61·4 grains avoirdupois.

1. *System.*—Grinding under millstones.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 per cent.

Impurities removed .. 12·1 "

87·9 "

Water absorbed to render mellow 2·7 "

90·6 "

Yield : flour .. 66·9 "

" middlings .. 0·76 "

" pollard .. 11·4 "

" bran .. 7·5 "

(Yield exceptionally low, color poor and murky; has no strength.)

(Yield low.)

86·56 "

Evaporation and loss .. 4·04 "

(See Notes, page 28.)

90·6 "

Gluten, by water test, when damp. 22·7 "

Do do when dry .. 7·5 "

2 *System.*—Crushing between rollers.

Quantity operated upon, 5,000 lbs.

Enter quantity treated as .. 100·0 "

Impurities removed .. 12·1 "

87·9 "

Water absorbed to render mellow 2·7 "

90·6 "

Yield : flour .. 66·0 "

" dark do .. 1·8 "

(Yield exceptionally low, color poor and murky; has no strength.)

67·8 "

" middlings .. 7·2 "

" pollard .. 6·5 "

" bran .. 4·9 "

(Yield low.)

86·4 "

Evaporation and loss .. 4·2 "

(See Notes, page 28.)

90·6 "

Gluten, by water test, when damp .. 17·1 "

Do do when dry .. 6·6 "

Synopsis and Comparison of Results obtained from Indian and other Wheats, by two Systems of Milling, by McDougall Brothers, at their Wheatstheaf Mills, London. Figures in Roman.—System : Grinding under millstones. Figures in *Antique*.—System : Crushing between rollers.

No.	Wheat.	Value in London per 496 lbs. net weight for Bushel value on day of valuation.	Weight for 100 separate grains of the Wheat.	Quantity used.	Impurities removed.	Water absorbed to render mellow.	Yield.				Evaporation and loss.	Gluten, by Water Test.
							Flour.	Middlings.	Pollard.	Bran.		
		s. d.	Lbs.	Grs. avdps	Lbs.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1	Indian (fine soft white)	49 0	64	55.4	5,000	1.52	77.46	.82	8.8	12.0	1.40	6.4
2	" (superior soft red)	49 0	64	55.4	5,000	1.52	74.10	1.10	8.7	4.0	2.68	6.8
3	" (average hard white)	45 0	62.3	51.8	5,000	.72	78.40	1.68	9.8	9.4	3.6	9.3
4	" (average hard red)	44 0	60	68.3	5,000	.37	73.4	7.7	13.5	5.3	.98	10.5
5	English	43 0	61.1	77.7	5,000	1.2	80.52	7.8	10.0	8.3	5.1	11.7
6	Australian	49 0	60.1	57.4	5,000	1.5	73.2	10.3	14.3	3.1	3.8	12.6
7	New Zealand	50 6	62.1	80.5	5,000	1.0	79.8	.78	13.20	8.0	4.04	13.4
8	Californian	48 0	62.2	67.6	5,000	.3	74.2	10.3	13.8	3.0	5.1	13.1
9	American (winter)	49 6	61.4	49.6	5,000	.5	65.2	11.1	9.7	17.7	4.8	10.6
10	" (spring)	48 0	61.4	49.6	5,000	.9	76.3	7.6	7.2	9.2	4.2	11.4
11	Russian (Saxonska)	52 0	60.1	37.3	5,000	.9	75.8	1.1	7.4	14.4	.3	11.6
12	" (hard Taganrog)	49 0	61.4	54.7	5,000	.8	75.1	8.0	9.3	5.3	1.1	12.2
13	Egyptian (Tahi)	47 0	58	50.1	5,000	.27	76.1	.96	8.8	11.5	2.34	10.2
14	" (Saida)	48 6	57.1	61.4	5,000	12.1	76.1	7.8	6.6	5.6	3.6	9.0
15	"	48 6	57.1	61.4	5,000	12.1	71.1	.72	9.2	18.3	1.98	10.5
16	"	49 6	61.4	49.6	5,000	.5	70.1	14.5	6.3	3.9	3.5	3.7
17	"	49 6	61.4	49.6	5,000	.5	73.8	.38	7.9	16.4	1.02	11.0
18	"	48 0	61.4	49.6	5,000	.9	71.5	10.3	11.2	3.1	3.4	11.7
19	"	48 0	61.4	49.6	5,000	.9	72.2	.24	7.2	14.7	4.76	15.3
20	"	52 0	60.1	37.3	5,000	.9	69.5	12.1	10.4	3.3	3.3	14.6
21	"	52 0	60.1	37.3	5,000	.9	73.0	1.2	11.6	12.6	.7	22.1
22	"	49 0	61.4	54.7	5,000	.8	71.4	12.5	11.7	3.3	.2	23.2
23	"	49 0	61.4	54.7	5,000	.8	76.2	1.2	12.7	8.1	3.4	17.6
24	"	49 0	61.4	54.7	5,000	.8	72.0	9.6	12.1	5.0	2.9	15.6
25	"	47 0	58	50.1	5,000	.27	72.9	1.0	11.0	10.0	5.5	4.4
26	"	47 0	58	50.1	5,000	.27	72.6	10.4	8.5	3.5	5.4	7.9
27	"	48 6	57.1	61.4	5,000	12.1	66.9	.76	11.4	7.5	4.04	7.5
28	"	48 6	57.1	61.4	5,000	12.1	67.8	7.2	6.5	4.9	4.2	6.6

When the manufacture of the wheats into flour was completed, we proceeded to convert into bread a given quantity of each flour from the Indian wheats by both systems of milling, and from the remaining wheats by the roller system, and the results obtained are stated in the following tables, with a tabular synopsis for convenience of ready comparison :—

BREAD.

No. 1.—From Indian fine soft white Wheat.

1. System.—Grinding under millstones.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water used	..	141.4	"	
Yield of bread when cold	..	364	"	(High.)
Percentage of bread to flour	..	130.0		(Do)
„ water to flour	..	50.5		(Do)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	10		
Color, interior	..	11		
Flavour	..	7		
Texture	..	8		(Rather dense.)
General characteristics	..	11		(Loaf small.)

2. System.—Crushing between rollers.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water used	..	149.6	"	(Very high.)
Yield of bread when cold	..	367.5	"	(Do)
Percentage of bread to flour	..	131.2		(Do)
„ water to flour	..	53.4		(Do)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	13		
Color, interior	..	13		
Flavour	..	9		
Texture	..	9		(Rather dense.)
General characteristics	..	12		(Loaf small.)

No. 2.—From Indian superior soft red Wheat.

1. System.—Grinding under millstones.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water	..	141.6	"	(High.)
Yield of bread when cold	..	372	"	(Very high.)
Percentage of bread to flour	..	133.0		(Do)
„ water to flour	..	50.6		(High.)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	8		
Color, interior	..	10		
Flavour	..	7		
Texture	..	9		(Rather dense.)
General characteristics	..	10		(Loaf small.)

2. *System*.—Crushing between rollers.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water	..	148	"	(Very high.)
Yield of bread when cold	..	362	"	(High.)

Percentage of water to flour	..	52·8		(Very high.)
Percentage of bread to flour	..	129·3		(High.)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	12		
Color, interior	..	13		
Flavour	..	9		
Texture	..	10		(Rather dense.)
General characteristics	..	11		(Loaf small.)

No. 3.—*From Indian average hard white Wheat.*

1. *System*.—Grinding under millstones.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water	..	141·0	"	(High.)
Yield of bread when cold	..	370·5	"	(Very high.)

Percentage of bread to flour	..	132·4		(High.)
Percentage of water to flour	..	50·3		(Do)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	6		
Color, interior	..	7		
Flavour	..	7		
Texture	..	10		(More elastic than Nos. 1 and 2.)
General characteristics	..	7		(Loaf small.)

2. *System*.—Crushing between rollers.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment	..	30	"	
Salt	..	3½	"	
Water	..	149·6	"	(Very high.)
Yield of bread when cold	..	365·	"	(High.)

Percentage of bread to flour	..	130·3		(Do)
Percentage of water to flour	..	53·4		(Very high.)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	10		
Color, interior	..	9		
Flavour	..	9		
Texture	..	10		(More elastic than Nos. 1 and 2.)
General characteristics	..	9		(Loaf small.)

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No. 4.—From Indian average hard red Wheat.

1. *System*.—Grinding under millstones.

Flour used..	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment ..	..	30	"	
Salt	..	3½	"	
Water used	..	145.2	"	(High.)
Yield of bread when cold	..	376.6	"	(Exceptionally high.)
Percentage of bread to flour	..	134.5		(Do)
Percentage of water to flour	..	51.8		(High.)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	5		
Color, interior	..	7		
Flavour	..	7		
Texture	..	10		(More elastic than Nos. 1 and 2.)
General characteristics	..	6		

2. *System*.—Crushing between rollers.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment ..	..	30	"	
Salt	..	3½	"	
Water	..	147.4	"	(Very high.)
Yield of bread when cold	..	365.0	"	(High.)
Percentage of bread to flour	..	130.3		(Do)
Percentage of water to flour	..	52.2		(Very high.)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	9		
Color, interior	..	9		
Flavour	..	8		
Texture	..	10		(More elastic than Nos. 1 and 2.)
General characteristics..	..	8		(Loaf small.)

No. 5.—From English Wheat.

System.—Crushing between rollers.

Flour used	..	280	lbs.	
French yeast	..	1	"	
Liquid potato ferment ..	..	30	"	
Salt	..	3½	"	
Water	..	130.0	"	(Rather low.)
Yield of bread when cold	..	352.0	"	(Do)
Percentage of bread to flour	..	125.7		(Do)
Percentage of water to flour	..	46.4		(Do)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	13		(Good.)
Color, interior	..	12		(Do)
Flavour	..	13		(Very good.)
Texture	..	10		(Silky and good.)
General characteristics..	..	10		(Loaf medium. Bloom not equal to best English after good harvest.)

No. 6.—From Australian Wheat.

System.—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	134.2	"
Yield of bread when cold	..	355.4	"
Percentage of bread to flour	..	126.9	(Medium.)
Percentage of water to flour	..	48.0	(Do)

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	12	
Color, interior	..	12	
Flavour	..	12	
Texture	..	10	(Good.)
General characteristics	..	11	(Medium in size.)

No. 7.—From New Zealand Wheat.

System.—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	132.0	"
Yield of bread when cold	..	349.0	"
Percentage of bread to flour	..	124.6	
Percentage of water to flour	..	47.1	

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	12	(Very good.)
Color, interior	..	12	(Do)
Flavour	..	12	(Do)
Texture	..	9	(Rather weak.)
General characteristics	..	10	(Loaf medium in size.)

No. 8.—From Californian Wheat.

System.—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	136.8	"
Yield of bread when cold	..	364.0	"
Percentage of bread to flour	..	130.0	
Percentage of water to flour	..	48.9	

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	12	(Very good.)
Color, interior	..	12	(Do)
Flavour	..	12	(Do)
Texture	..	9	(Rather weak.)
General characteristics	..	10	(Loaf medium in size.)

No. 9.—*From American winter Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	130	"
Yield of bread when cold	..	346	"

Percentage of bread to flour	..	123.5
Percentage of water to flour	..	46.4

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	13	(Very good.)
Color, interior	..	12	(Do)
Flavour	..	12	(Do)
Texture	..	10	(Good.)
General characteristics..	..	11	(Loaf medium in size.)

No. 10.—*American spring Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	130	"
Yield of bread when cold	..	354	" (Good average.)

Percentage of bread to flour	..	126.4
Percentage of water to flour	..	46.4

Taking 10 as standard of fair average

London bread,—

Color, exterior	..	8	(Too red.)
Color, interior	..	10	
Flavour	..	10	
Texture	..	12	(Very good, elastic.)
General characteristics..	..	9	(Loaf lofty.)

No. 11.—*From Russian Saxonska Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment..	..	30	"
Salt	..	3½	"
Water	..	130	"
Yield of bread when cold	..	356	" (Good average.)

Percentage of bread to flour	..	127.1
Percentage of water to flour	..	46.4

Taking 10 as standard of fair average London bread,—

Color, exterior	..	8	(Too red.)
Color, interior	..	9	
Flavour	..	9	
Texture	..	13	(Very good, elastic.)
General characteristics..	..	9	(Loaf very lofty.)

No. 12.—*From Russian hard Taganrog Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	145·4	"
Yield of bread when cold	..	354·5	"

Percentage of bread to flour	..	126·6
Percentage of water to flour	..	51·9

Taking 10 as standard of fair average

- London bread,—

Color, exterior	..	10	(With fine bloom.)
Color, interior	..	11	(Do)
Flavour	..	9	
Texture	..	12	(Very good, elastic.)
General characteristics	..	9	(Fair loaf, but smaller than expected.)

No. 13.—*From Egyptian (Buh) Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	136·8	"
Yield of bread when cold	..	362·0	"

Percentage of bread to flour	..	129·3
Percentage of bread to flour	..	48·9

Taking 10 as standard of fair average

- London bread,—

Color, exterior	..	7	(Very inferior.)
Color, interior	..	6	(Do)
Flavour	..	6	(Do)
Texture	..	7	(Do)
General characteristics	..	5	(Loaf very small and heavy, possessed no good points.)

No. 14.—*From Egyptian (Saida) Wheat.**System.*—Crushing between rollers.

Flour used	..	280	lbs.
French yeast	..	1	"
Liquid potato ferment	..	30	"
Salt	..	3½	"
Water	..	144·4	"
Yield of bread when cold	..	358·0	"

Percentage of bread to flour	..	127·7
Percentage of water to flour	..	51·6

Taking 10 as standard of fair average

- London bread,—

Color, exterior	..	6	(Very inferior.)
Color, interior	..	4	(Do)
Flavour	..	4	(Do)
Texture	..	6	(Do)
General characteristics	..	4	(Loaf small and heavy, and a degree worse than from the Buh wheat, Lot 13.)

SYNOPSIS.

THE FLOURS AND BREADS.

Results obtained in converting the Flours into Bread.

NOTE.—Of Lots 1, 2, 3, 4, Indian Wheats, the stone flours and roller flours were made into Bread. Of Nos. 5 to 14 inclusive the roller flours only were made into Bread. Figures in Antique.—System: Grinding under millstones. Figures in Roman.—System: Crushing between rollers.

Wheat.	Quantities used.				Yield of Bread when cold.	Percentages.	Color, Taste and Texture. (Taking 10 as the standard of fair average quality of London Households Bread made from London Flour, Households and Whites in equal proportions.)				Remarks.			
	French Yeast.		Liquid Potato Ferment.				Percentage of Bread to of Flour.	Percentage of Water to Flour.	Color, exterior.	Color, interior.		Flavour.	Texture.	General Characteristics.
	Lbs.	Lbs.	Lbs.	Lbs.										
1 Indian (fine soft white) ...	280	1	Lbs.	Lbs.	Lbs.	130.0	50.5	10	11	7	8	11	Loaf small and rather dense. Do Do Do Do; texture more elastic. Do Do; too ricey. Do Loaf medium. Bloom not equal to best English after good harvest. Flavour very good. Fine silky texture. Loaf medium size. Texture good; silky. Loaf medium size. Texture little weak. Dough of putty nature. Loaf medium in size. Texture a little weak. Crust too pale. Loaf medium in size. Texture good. Loaf lofty. Elastic texture. Handles kindly. Loaf very lofty. Very elastic texture; so strong operatives complained required too much strength in handling it. Loaf lofty. Fine bloom. Texture good. Red crust. Loaf possessed no good points. Do; a degree lower than above.	
2 " " (superior soft white) ...	280	1	30	3 1/2	141.4	131.2	53.4	13	13	9	9	12		
3 " " (average hard white). ...	280	1	30	3 1/2	141.6	133.0	50.6	8	10	7	9	10		
4 " " (average hard red) ...	280	1	30	3 1/2	148.0	129.3	52.8	12	13	9	10	11		
5 " " (average hard red) ...	280	1	30	3 1/2	141.0	132.4	50.8	6	7	7	10	7		
6 " " (average hard red) ...	280	1	30	3 1/2	145.6	130.3	53.4	10	9	9	10	9		
7 " " (average hard red) ...	280	1	30	3 1/2	145.2	134.5	51.8	5	7	7	10	6		
8 English ...	280	1	30	3 1/2	147.4	130.3	52.2	9	9	8	10	8		
9 Australian ...	280	1	30	3 1/2	130.0	125.7	46.4	13	12	13	10	10		
10 New Zealand ...	280	1	30	3 1/2	134.2	126.9	48.0	12	12	12	10	11		
11 California ...	280	1	30	3 1/2	132.0	124.6	47.1	12	12	12	9	10		
12 American (winter) ...	280	1	30	3 1/2	136.8	130.0	48.9	12	12	12	9	10		
13 " (spring) ...	280	1	30	3 1/2	130.0	123.5	46.4	13	12	12	10	11		
14 Russian (Saxonska) ...	280	1	30	3 1/2	130.0	126.4	46.4	8	10	10	12	9		
15 " (hard Taganrog) ...	280	1	30	3 1/2	130.0	127.1	46.4	8	9	9	13	9		
16 Egyptian (Buh) ...	280	1	30	3 1/2	145.4	126.6	51.9	10	11	9	12	9		
17 " (Saida) ...	280	1	30	3 1/2	136.8	129.3	48.9	7	6	6	7	5		
18 " ...	280	1	30	3 1/2	144.4	127.7	51.6	6	4	4	6	4		

NOTES.

The Evaporation and Loss in milling.—The percentages under this heading, it will be noticed, vary considerably from—

No. 11, Russian Saxonska, stones ..	..	..	0·7
rollers ..	..	..	0·2 to
No. 13, Egyptian—Buhī, stones ..	..	..	5·5
rollers ..	..	..	5·4

These variations must not be attributed chiefly to the differences in qualities of the wheats, as they arise mainly from the waste and loss that is inseparable from working small quantities on a practical scale; about ten quarters of each wheat was operated upon in these experimental workings, whereas in ordinary milling a “grist” will run from one thousand to several thousand quarters. This will be readily understood, when it is borne in mind that, after the working of each separate wheat by either process, the stones or rollers, hoppers, elevators, dressing silks, &c., have to be swept out, and it is impossible to avoid some waste from this cause. In milling operations it is found there is a larger loss, &c., “unaccounted for” on inferior wheats than upon good wheats, but it does not exceed a total of 1 to 2 per cent. For practical purposes, the items Evaporation and Loss should be taken as obtained by competent millers, viz. :—

From stones ..	..	..	1 to 2 per cent.
From rollers ..	..	..	1 to 3 per cent.

according to the qualities of the wheats.

Water used in Bread making.—The difference in the quantities of water required by each of the flours from Indian wheats per 280 lbs. flour in making them into bread (ranging from 149·6 lbs. to 141·0 lbs. water) is partly accounted for by the fact of somewhat similar variations in the water absorbed in rendering the wheats mellow for milling.

Weight per bushel of Wheats.—These experimental workings have brought to light a fact well worth noting, viz., that the rule so generally held amongst wheat sellers and buyers, and thought to be without an exception, that the greater the weight of a bushel of wheat so much higher must it rank as a flour yielder, and consequently in value, must now be regarded as true only within a strict limit. A high standard of weight for any given cubical measurement is, no doubt, a good criterion as to dryness of condition and soundness of the grain, for any dampness in grain causes it to weigh *lighter* per bushel or quarter of measurement instead of heavier (a fact which will surprise the uninitiated). But experienced parties will study with interest the three columns in the synopsis of the wheats showing “weight of 100 separate grains” of each wheat, “weight per bushel,” and “yield of flour.” Taking equal weights of the four Indian wheats, it will be found that No. 3, weighing 60 lbs. per bushel, yielded more flour than No. 1, weighing 64 lbs.; also, that No. 4, weighing 60 lbs. per bushel, yielded more flour than No. 2, weighing 62½ lbs. The reason of this is evident. The four wheats were equally and perfectly dry, and probably would have weighed the same per bushel had the size and shape of the grains of each wheat been the same, but they differ widely in this respect, Nos. 1 and 2 being medium or small, and Nos. 3 and 4 long and arched. Hence the latter will not fill into a measure as closely as the former, leaving larger spaces unoccupied, and causing any given measure to weigh less in consequence. The old rule holds good for wheats the grains of which in size and shape are similar, but it will only mislead if applied to Indian wheats like Nos. 3 and 4. It was, doubtless, adopted at a period when it was the custom for all wheats to be sold by measure, and for sales by measure it is still a correct guide, but as sales are now made by weight rather than by measure, the rule can only safely be applied within the limits indicated.

After a careful examination of the wheats, of the flours and offals, of the bread obtained from the flours, and the records of the workings of each process, we have further to report :—

The four lots of Indian wheats were delivered to us, packed in the ordinary gunny bags, and all in good condition. None of them were sea damaged, nor had they suffered in any way from storage in the ship.

We examined the wheats and found them to be good representative sample of—

- No. I. Indian fine soft white,
- No. II. Indian superior soft red,
- No. III. Indian average hard white,
- No. IV. Indian average hard red,

but were, with the exception of No. 3, much cleaner and freer from impurities than these wheats generally are.

The leading characteristics of these wheats, details of which are in the tabulated statement, are as follows :—

The fine soft white (Lot 1).—Grains white, medium sized, and regular ; fairly mellow ; skin thin ; handled exceedingly well ; weight per bushel, 64 lbs. ; which is only equalled by specially fine samples of any wheat. Clean and free from seeds ; contained 2 per cent. of weevilled grains.

Results of the milling and bakings prove it is an exceedingly good and useful wheat ; the flour being great in quantity, of pure white color and superior bloom, and with a slight beany flavour. It is more suitable for markets requiring *white* flours rather than strength, owing to its containing an exceptionally low percentage of gluten. The yield of bread from it is very large.

Superior soft red (Lot 2).—Grains dull light-brown, with about 5 per cent. white wheat. In size, half medium and half small ; semi-hard ; skin thin ; handled very well ; weight per bushel, 62½ lbs., which is only reached by fine wheats. Clean and free from seeds ; contained only a trace of weevil.

Results of the milling and bakings prove it is good and useful wheat ; the flour being great in quantity and of medium color and strength, with slight beany flavour, and containing an average of gluten. Suitable for markets requiring flours of medium strength and color. The yield of bread is exceptionally large.

Average hard white (Lot 3).—Grains light yellow and semi-transparent, with a little hard red ; skin thin ; in shape long and arched. The wheat itself was clean, but intermixed there was about 3 per cent hard dry bits of mud (which spoiled the handling), otherwise free from admixture. Weight, 60 lbs. bushel. Weevils only a trace.

Results of the milling and bakings prove it is a useful wheat for markets requiring strength ; flavour, beany ; the gluten (by water test) averaging 12 per cent. This wheat (and No. 4) are probably unsurpassed by any other wheats in the world as regards the quantity of flour yielded. In color, medium. Specially useful for mixing with very damp English wheats to bring them into condition for milling. It is also a profitable wheat for millers, owing to its requiring 8·4 per cent water to render it sufficiently mellow for use.

To this wheat, and to the Indian average hard red (Lot 4), must be awarded the distinction of *producing more bread than any other flour*, making it a “ baker’s flour as well as a “ miller’s”. The yield of bread is exceptionally large.

Average hard red (Lot 4).—Grains very large and coarse, long, arched and pointed ; in color dull brown, and semi-transparent, with an admixture of 10 per cent fine soft white ; skin thin ; handles well ; contains a little gram, seed, linseed, and barley. Weight, 61½ lbs. per bushel. Weevils only a trace.

Results of the milling and bakings prove it produces a common and dry strong flour, in almost unequalled quantity. In color, inferior. A profitable wheat for millers, as it takes 7·6 per cent water to render it sufficiently mellow for use. The yield of bread is exceptionally large, making it a “ baker’s” flour as well as a “ miller’s.” (See remarks on Lot 3.)

For characteristics and particulars of the other wheats and flours obtained from them, we beg to refer back to the tabulated statements, and need here only further remark respecting them.

No. 5, English.—The yield was poor, undoubtedly owing to these wheats this season being in poor condition, and color of flour not equal to that from this wheat when in prime condition.

No. 6, Australian, and No. 7, New Zealand.—High yields. Color and bloom of flours superior, and other characteristics very similar, except that Australian is decidedly stronger.

No. 8, Californian.—These wheats would be improved if the small quantity of barley and oats they so frequently contain could be kept out, which cannot be entirely removed by any separating machines, as they slightly depreciate the flour. Whilst below Australian and New Zealand in yield and strength (the former arising from its somewhat thicker skin), perhaps in the special points of color and bloom this flour, and that from American red winters (No. 9), are unequalled.

No. 9, American red winter.—The same remarks as on Lot 8 as to yield and quality of the flour.

No. 10, American spring.—Medium yield, arising from thickness of the skin, and the cockle and the buckwheat present. The flour is of good color and superior strength.

No. 11, Russian, Saxonska.—Medium yield of flour, good in color, and in strength quite unequalled. An invaluable wheat for mixing with weaker ones to add strength to the flour. Of gluten it contains (by the water test) 22.1 per cent (dry), or double of that contained in the English lot.

No. 12, Russian, Taganrog.—Good yield, color of flour good, with much yellow bloom, and for strength ranks next to Saxonska (No. 11).

No. 13, Egyptian Buhi.—Ranks only one degree above Saida (Lot 14.)

No. 14, Egyptian, Saida.—Deservedly ranks as the poorest wheat in the market; possesses no good qualities, and is not nearly worth its price.

The two Systems of Milling.

That of *grinding under millstones* has been in operation from time immemorial, and with but slight improvements, those of recent years relating chiefly to the dress or separation of the offals from the flour by the employment of cylinders lined with silk, instead of wire, within the dressing machines. This system produces flour of one "run" or quality, and does not offer facilities for the production of flours of high, medium, and low grades from the same wheat. Unless care is taken in the grinding to keep the stones sufficiently high, the flour is apt to be "dead" or "killed," that is, to lack anything approaching to granular character, owing to the stones having been employed too close together. On the other hand, if the stones are worked too "high," a loss results from all of the flour not being removed from the bran. It is inseparable from this grinding system that some of the outer skin or bran is also torn or ground into flour, so preventing the attainment of perfection of color. It is well adapted, however, for the production of common ordinary flours, for, as will be readily seen, it must produce a *greater quantity* of flour than a system which more thoroughly separates the offals.

By the roller system flour is produced by flattening or squeezing the grain through a series of rollers, as distinguished from the tearing or grinding of millstones. The wheat is first cracked through a first set of rolls and its sieve, so separating a small quantity of flour and dirt, the latter being liberated out of the crease of the wheat, and is not removable by any system of brushing or blowing. It is important to get rid of this impurity at the initial step of the process, as it then does not get incorporated with the subsequent flours. The cracked and purified wheat is then passed on through other sets of rolls and sieves, and rendered into middlings and flour. From these middlings the higher grades of flour are made; they are first freed from all light particles of the skin by being passed through "purifiers," and then through several successive sets of rolls and silks, each set yielding flour of a different grade. Each grade may be kept separate, or caused to run together into a mixing worm and so become one run of flour. (The wheats operated upon by this system in these experimental workings were so rendered into flour of one run or quality.) A leading feature in this system is that the germ of the wheat, in which lies the chief portion of the coloring matter of the grain, is not torn or ground into flour as it is by the system of grinding under stones, but the action of the rollers is to squeeze or flatten it, and, from its soft and oleaginous nature, to increase its size, so rendering its separation from the flour easy. The outer skin or bran is also freed from its adhering flour by the same pressure. But, inasmuch as hardly any of the bran is crushed into flour, the yield of offals must be larger than from the grinding system. The advantages of the system are, less liability to "kill" or destroy the granular nature of the flour, the removal of the dirt found in the creases of the wheat, and the separation of the germ, so rendering the attainment possible of a high standard in the character, color, and bloom of the flour. It is attended with a slightly increased yield of offals, which of course means the quantity of wheat required to produce a sack of flour must be proportionately increased; as a rough average, say 400 lbs. wheat for rollers against 380 lbs. for stones. Offals of very similar quality are produced by both systems *viz.*, coarse middlings, pollard, and bran, except that the bran from the rollers is smaller than from stones, and is consequently slightly lowered in value, say about 10s. per ton. The percentages of offals yielded by each system are given in the tabulated returns.

In these experimental workings the meshes of the silks through which the flours were dressed were as follows:—

In the grinding process	..	..	Silks No. 12.
„ roller	„	..	„ „ 13 (or one shade finer).

The Offals.—This is a subject of minor importance as compared with the yields and qualities of flour and bread, and it is only needful to state that, of the offals included in these returns, the middlings from both systems of milling were worked down to the quality known on the Mark Lane market as “coarse mids., fair average,” the bran to “bran from stones” and “bran from rollers,” and the pollard to “pollard, fair average.”

Gluten in bread.—From an economical standpoint it may be said the nutrition of bread mainly depends upon the gluten, or, in other words, the nitrogenous or albuminous compounds or flesh formers, contained in the flour from which it is produced. The starch would be equally important if it could not be obtained from other sources in as suitable a form at a much cheaper rate—as in rice, Indian corn, and potatoes. But its gluten is not obtainable from other sources, of equal quality and flavour. Hence its special value as a constituent of wheat. Further, upon the gluten in flour depends the elasticity of the texture of the bread, and consequent freedom from density or heaviness. It is generally believed that upon the percentage of gluten in flour depends the *yield* of bread that may be obtained from it; as illustrated by the Hungarian flours, which are almost unequalled for yield of bread, and rank high in gluten, but this is erroneous, as proved by the experimental workings now under review. It will be found that the flours high in gluten do not produce the most bread, unless, at the same time, they possess a high degree of *dryness*, for it is upon the *dryness* of a flour that the yield of bread mainly depends, and not upon the gluten. The two lots of flour from Russian wheats (Nos. 11 and 12) are those which are highest in gluten, yet they do not yield as much bread as any of the four Indian wheats (Nos. 1 to 4), and the difference in yield from the latter would have been still further increased had they not been previously mellowed with water, as noted, before milling; confirming it is the dryness of a flour that determines the yield of bread.

Another erroneous idea is, that upon the quantity of gluten present depends the height or loftiness of the bread. This would be correct, provided the fermentation of the dough were in all cases carried to a precise degree; but it varies widely, and it will be found the loftiness or height of the bread depends chiefly upon a high degree of fermentation, provided it be not carried to great excess, rather than upon the gluten. This is illustrated by the bread consumed in the London district, which is made from flours rich in gluten, yet is not so high or lofty as the bread consumed in some other districts, which is produced from flours containing much less gluten, the popular taste in London demanding strength, nutrition, and then fair color, whereas, in the districts referred to, a high degree of whiteness is demanded before nutrition.

The four Indian Wheats.

In addition to the particulars contained in the foregoing returns, we have to report that to any one experienced in the requirements of the wheat and flour markets of the United Kingdom and, indeed, of most other countries, it will be evident there is no probability of these Indian wheats coming into demand for manufacture into flour *without a liberal admixture* of other wheats. They all possess in a marked degree the same characteristics of great dryness, and a distinct beany and almost aromatic flavour, inseparable from wheats grown in the climates and soils of the tropics. Also the flours are ricey, the texture of the breads is too close, and the crust is hard and brittle. But these characteristics do not detract from their usefulness in any important degree. As is well known a miller cannot show skill in his craft to greater advantage or profit than that with which he selects his wheats, and mixes his grists, so as to produce to best advantage a flour from which bread can be made of the color, bloom, strength, and flavour desired, and with all a good yield.

We pronounce them to be exceedingly useful wheats, in fact hardly equalled for what is deficient and wanting in the English markets by any other wheats. Their chief characteristics are just those in which the wheats grown in our variable climate are most deficient. Their great dryness and soundness renders them invaluable for admixture with English wheats that are in any degree out of condition through moisture, and the great proportions of the wheats harvested here have been in that condition for some years past, a condition that must prevail in all other than that of wheats harvested and stored during fine and favorable weather; and this the English farmer knows, greatly to his cost, is a state of climate that is by a long way the exception rather than the rule. Added to their dryness, the thinness

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of the skins of these wheats and consequent greatness of the yield of flour, must always place them in the front rank as a "miller's" wheat, whenever they are handled with reasonable intelligence and skill.

Such unprecedented yields of flour, as shown by these wheats, ranging (by ordinary grinding) from 77.46 to 80.52 per cent against English 65.2 and American spring 72.2, speaks volumes in their favour, and their value is still further increased by another point of merit of almost equal importance, *viz.*, a larger percentage of bread may be obtained than from any other of the flours included in this review.

That, for the best of these Indian wheats (the fine soft white), on the day they were valued on Mark Lane market, a price was offered as high as that for American winters, New Zealand or English (see list of values in synopsis), proves that the great value of the Indian wheats is becoming recognized here, a knowledge that will ere long extend to all our markets. The other lots of Indian (Nos. 2, 3, and 4) were lower in value to the extent of 4s. to 5s. per quarter, as might almost have been expected from the difference in color and other characteristics; still, as these latter wheats become better known here, this difference in price will be somewhat lessened. Their beany flavour is not a serious obstacle, as fair average deliveries, when well cleaned and properly dealt with, can be employed in the proportion of 25 per cent to 50 per cent along with home-grown or other wheats, such as Americans, possessing a fine sweet, milky, or nutty flavour.

Glancing at all the facts here elaborated, it is evident that these wheats afford a larger margin of profit both to the miller and baker than any other.

We venture to record a conviction we have long held, strongly emphasized by the results of these experimental workings, of the measureless importance of the great resources of the Indian empire being developed to the utmost in producing wheat for this country. Farmers here are finding that to live they must produce beef and mutton rather than grain, hence the greater need of resources of supply under our own control.

It is evident such a conviction is common to the members of your Honourable Council, as testified by their unceasing efforts in this direction. And we desire heartily to congratulate them upon the important fruits arising from their labours. The character and general excellence of the Indian wheats are improving with the deliveries of each successive season. The Indian wheats now specially under review were delivered to us in excellent condition (see details) with freedom from dirt (except Lot No. 3), barley, gram, and other impurities, also with a freedom from weevil, rarely equalled by Indian wheats, except the prime parcels of the past season, and there is no doubt an outlet in this country and the European continent for unlimited quantities at prices that shall prove remunerative to all parties concerned, either in their growth, transportation, or conversion into flour and bread.

10, MARK LANE, LONDON,
15th December 1882.

We have, &c.,
McDOUGALL BROS.